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GAS BURNER

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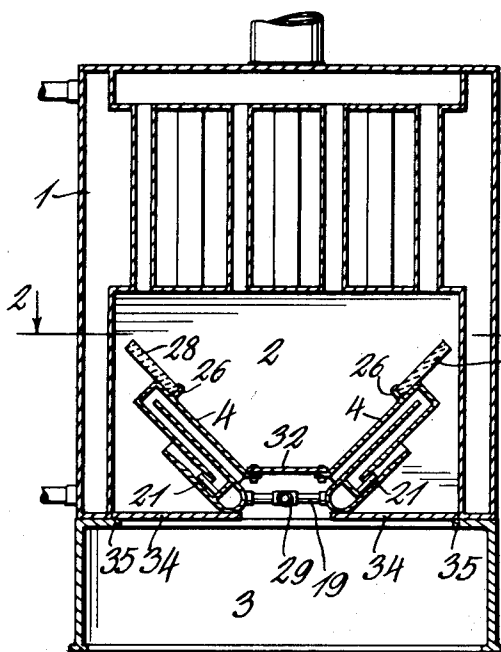


Fig. 1.

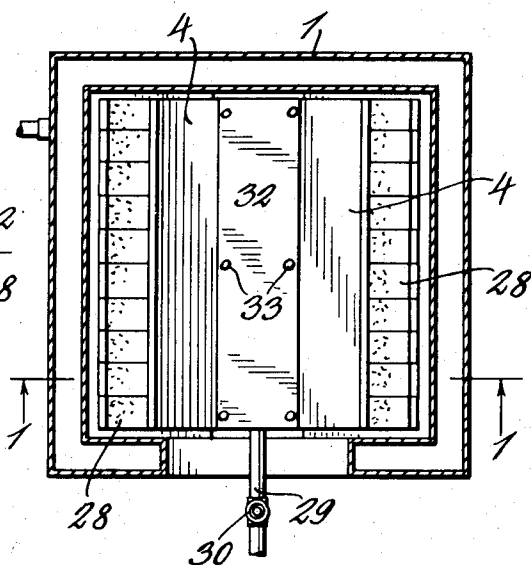


Fig. 2.

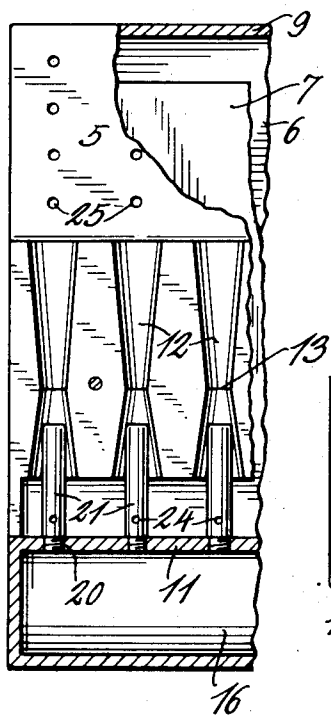


Fig. 3.

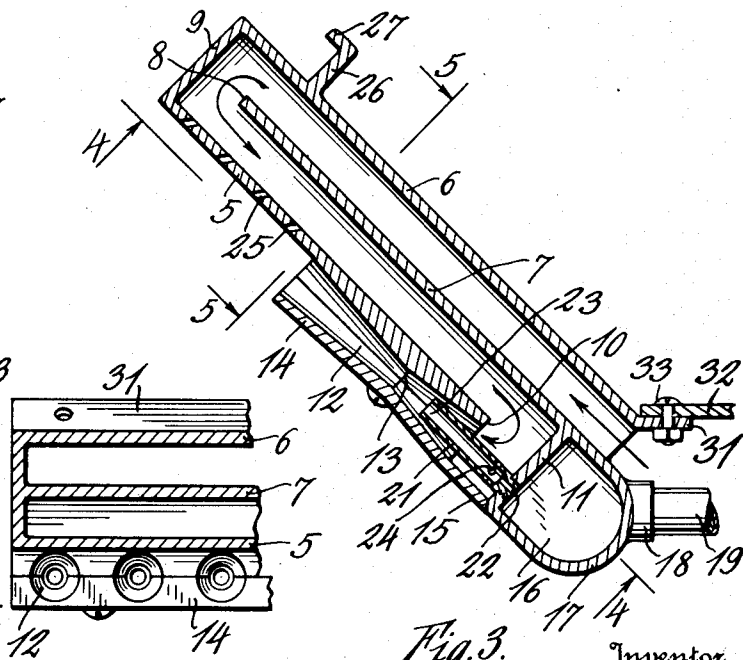


Fig. 4.

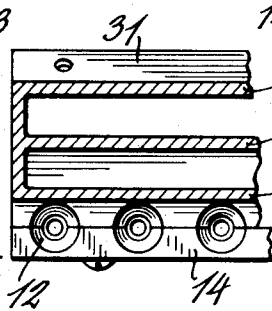


Fig. 5.

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GAS BURNER

Application filed May 28, 1930. Serial No. 456,510.

This invention relates to improvements in gas burners and has reference more particularly to gas burners of the type employed in connection with natural and artificial gas for the purpose of heating buildings and for other similar uses.

It is an object of this invention to produce a gas burner of a simple construction that can be made at a reasonable price, and which can readily be installed in the combustion chamber of a furnace or boiler.

Another object of this invention is to produce a gas burner of such construction that the gas shall be thoroughly mixed with a sufficient amount of air to produce complete combustion and which, in addition, shall provide auxiliary air that envelops the flame so as to furnish oxygen to combine with any carbon that may otherwise escape without being fully consumed.

Another object of this invention is to produce a device in which the air shall be preheated to a very high temperature before it is mixed with gas and which will therefore have a high thermal efficiency.

This invention, briefly described, consists of a burner comprising a body member of considerable width and length and which is provided near or along one edge with a gas manifold to which a large number of nozzles are connected. An air passage is provided that extends upwardly in the direction of the nozzles and doubles on itself so as to form a passageway that parallels the direction of the flames and which therefore is heated to a high temperature when the burner is in operation, whereby the air becomes preheated to a high degree.

Having thus briefly described the invention, the same will now be described in detail, and for this purpose reference will be had to the accompanying drawings in which the preferred embodiment of the invention has been illustrated, and in which:

Fig. 1 is a vertical section taken on line 1—1, Fig. 2, and shows my improved burner in place in the combustion chamber of the boiler;

Fig. 2 is a section taken on line 2—2, Fig. 1, and shows a top plan view of the burner;

Fig. 3 is a section of the burner corresponding to the section shown in Fig. 1, but to a larger scale;

Fig. 4 is a section taken on line 4—4, Fig. 3; and

Fig. 5 is a section taken on line 5—5, Fig. 3.

In the drawings numeral 1 represents a hot water boiler having a combustion chamber 2 and an ash pit 3, but it may also represent any other heating apparatus such, for example, as a hot air furnace or a steam boiler. Instead of the usual grates employed for burning coal I have substituted two of my improved gas burners which have been designated in their entirety by reference numerals 4. These burners are preferably formed from cast iron and are made hollow as shown in Fig. 3, which is a transverse section through one of the burners. The burners illustrated are of rectangular shape and have a cross section like that shown in the drawings. Each burner has two parallel sides 5 and 6, whose inner surfaces are spaced apart so as to form a chamber. This chamber is divided into two parts by means of a partition 7. This partition terminates at a point 8 which is spaced a short distance from the end wall 9, so as to leave an opening that connects the two parts of the chamber whereby the latter is formed into a passageway through which the air may flow in the direction of the arrows. Wall 5 terminates at a point 10, which is spaced a short distance from the end wall 11 and the outer surface of wall 5 is provided with a plurality of semi-frusto-conical depressions 12 that taper towards each end and have their smallest diameters at 13. A removable cover plate 14, has its inner surface provided with semi-frusto-conical depressions like those indicated by reference numeral 12 and these are so spaced that when the cover plate is in place, the depressions will register so as to form openings that flare outwardly from the center point 13 in the manner shown quite plainly in Fig. 3. Plate 14 has a downward extension 15 that comes into contact with the outer end of the transverse wall 11. A gas manifold 16 is formed by the curved wall 17 and the partition 11 and this is provided with an outwardly extend-

ing threaded nipple 18 that is adapted to receive one end of the gas pipe 19. The partition 11 is provided with a number of spaced openings 20 which are threaded for the reception of the nozzles 21. These openings are so spaced that when the nozzles are in place, they occupy a position in which their axes coincide with the center of the restricted portion 13. Each nozzle is provided with a small opening 22 that is in communication with the gas manifold and with a larger opening 23 that extends to the outer end of the nozzle. Each nozzle is also provided with openings 24 adjacent the bottom of opening 23. Openings 24 put the interior of the nozzles in communication with the air passageway and when gas is flowing through the small opening 22, it produces a suction that causes air to flow into the nozzles through openings 24, thereby providing primary air for the burner. When the air and gas emerge from the upper ends of the nozzles and flow into the frusto-conical openings 12, a suction is produced which causes air to flow between the nozzles and the inner surfaces of openings 12 and to mix with the gas and air that emerges from the nozzle. This will be referred to as the secondary air supply. The mixture of gas and air is inflammable and produces a flame when it emerges from the openings 12. Attention is called to the fact that wall 5 is provided with a number of openings 25 directly above each of the openings 12 and these are inclined in the manner shown in Fig. 3 and therefore air will flow through these openings and come into contact with the outer surface of the flame. This air supply will be referred to as the secondary air supply, when the burners are in operation they become heated to a high temperature and the air that flows through the passageways between the partition 7 and walls 5 and 6 becomes preheated to a high degree, and this adds greatly to the efficiency of the burner. Wall 6 is provided near its upper end with a flange 26 that has an upwardly extending projection 27 and this wall and projection are adapted to receive and to hold plates 28 of fireclay or other refractory material. These plates extend upwardly and outwardly into quite close proximity to the inner surface of the combustion chamber and serve to direct the flame against the walls of the combustion chamber. The gas is supplied through a pipe 29 that may be controlled by a manually operated valve 30 or by some thermostatically operated valve as may be desired. The lower end of wall 6 has a flange 31 that is adapted to serve as a support for the plates 32. These plates may be held in place by means of screws 33. Plates 34 extend from the sides of the combustion chamber to a point near the center and serve as supports for the burner. Plates 34 may rest on the lugs 35 that previously supported the grates where a coal

burning boiler has been converted into a gas burning boiler. The air enters through the space between plates 34 and passes upwardly through the passageways in the burner in the direction of the arrows and mixes with the gas in the manner above described. These burners can be made of any length and can therefore be placed side by side so as to fit any size of combustion chamber. In the drawings each burner has been shown to be a single piece, but they can be of as many sections as desired.

Although the openings 12 are preferably of the shape shown in the drawings so as to form Venturi tubes this is not absolutely necessary, as it is possible to have cylindrical openings, but openings of the shape shown are believed to be preferable.

I want to call particular attention to the fact that the burner constructed in the manner shown and described preheats the air to a very high temperature before it is mixed with the gas and this, as pointed out above, gives a better thermal efficiency than could be obtained if cool air were employed.

In the drawings I have not shown pilot burners, but such means for lighting the gas may be provided whenever desired as it is an old and well known expedient.

From the above description it will be seen that I have produced a very simple burner that is especially well adapted for burning gas in furnaces and other places where a large amount of heat is necessary and which is provided with means for supplying air to the gas at three separate places, one of which is at the point where the gas emerges from the small opening 22 and which is called the primary air, the other being at the end of the nozzle where the air enters through the space between the inner walls of the openings 12 and the outer surfaces of the nozzle and the third place being through openings 25. By this means sufficient air is supplied to produce complete combustion and therefore all of the heat units of the gas will be converted into heat and a high thermal efficiency obtained.

On the drawings and in the specification, the burner has been shown and described as adapted for a rectangular combustion chamber, but it is evident the burners can easily be made so as to fit a circular combustion chamber and when this is to be done, the burner sections, instead of being flat, are slightly concave on one side and convex on the other and made in the shape of sectors so that when they are assembled, they form a frusto-conical surface. This modification has not been shown because it merely involves a slight change in the shape and does not effect the construction or the operation of the burner.

Particular attention is directed to Fig. 3 from which it can be clearly seen that all of the air that is mixed with the gas is first heated and in this way more efficient combustion

tion is obtained than if the air were mixed cold.

Having described the invention what is claimed as new is:

5 1. A gas burner comprising a body member having a gas manifold, a plurality of nozzles secured to the manifold, the nozzles having each an opening extending entirely through the same, one end of the opening being smaller
10 than the other end, the small opening being in communication with the interior of the manifold, the walls of the nozzles being provided with air inlets adjacent the bottom of the larger of the two different sized openings,
15 the body member having also a plurality of elongated openings into which the nozzles extend, there being one elongated opening for each nozzle, the body member having a passageway for air, one end of the passageway being in communication with the atmosphere
20 and the other in communication with the inner ends of the elongated openings whereby the air that passes into the nozzles as well as the air that enters the elongated openings around the nozzles must first pass through the
25 passageway and become preheated.

2. A gas burner comprising a hollow body member having one side open and the other side closed, a partition extending inwardly
30 from the open side and terminating a short distance from the closed side whereby a passageway is formed, the partition having its outer end provided with a gas manifold formed in part by a wall extending outwardly
35 beyond the adjacent wall of the body member and spaced from the latter, the last named wall having a plurality of openings extending substantially parallel to the partition, and a plurality of nozzles secured to the manifold and projecting into the openings, each
40 nozzle having an opening extending from one end thereof to the other, said opening comprising sections of different diameters, that part of the opening in communication
45 with the manifold being smaller in diameter than the other, the nozzle being also provided with openings through its sides, said openings being located adjacent the outer end of the section of the larger diameter whereby
50 primary air will be drawn into the nozzle through these openings when gas is flowing from the manifold.

3. A gas burner comprising a hollow body member of extended area whose length is
55 greater than its width and whose thickness is less than its width, one of the longer narrow sides being open and the other closed and the two ends being closed by end walls, a partition extending inwardly from the open side
60 of the body member, said partition being connected to the end walls and spaced from the side walls so as to form an air passageway comprising two parallel sections, the outer end of the partition having a gas manifold,
65 a plurality of nozzles connected with the

manifold and spaced short distances apart in the direction of the length of the burner, the wide side wall of the burner adjacent the nozzles having a plurality of elongated openings in axial alignment with the nozzles, which
70 extend into the openings, the outside of the manifold and the outside of the wall having the openings being connected whereby the nozzles will be enclosed in a chamber that is in communication with the inner end of the
75 air passage, the nozzles being each provided with openings through their walls which connect their interiors with the inner end of the air passageway for the purpose of permitting air to flow into the nozzles and mix with the
80 gas therein.

4. A gas burner comprising a hollow body member of extended area whose length is greater than its width and whose thickness is less than its width, one of the longer narrow
85 sides being open and the other closed and the two ends being closed by end walls, a partition extending inwardly from the open side of the body member, said partition being connected to the end walls and spaced from the
90 side walls so as to form an air passageway comprising two parallel sections, the outer end of the partition having a gas manifold, a plurality of nozzles connected with the manifold and spaced short distances apart in the direction of the length of the burner, the
95 wide side wall of the burner adjacent the nozzles having a plurality of elongated openings in axial alignment with the nozzles which extend into the openings, the outside of the manifold and the outside of the wall having the openings being connected whereby
100 the nozzles will be enclosed in a chamber that is in communication with the inner end of the air passage, the nozzles being each provided with openings through their walls which connect their interiors with the inner end of the air passageway for the purpose of permitting air to flow into the nozzles and mix with the gas therein, the burner wall
105 having the elongated openings being also provided with a plurality of holes located above the upper end of the openings and through which secondary air can flow from the air passage and contact with the flame.
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5. A gas burner comprising a hollow body member of extended area whose length is greater than its width and whose thickness is less than its width, one of the longer narrow
120 sides being open and the other closed and the two ends being closed by end walls, a partition extending inwardly from the open side of the body member, said partition being connected to the end walls and spaced from the side walls so as to form a passageway comprising two parallel sections, the outer end of the partition having a gas manifold, a plurality of nozzles connected with the manifold and spaced short distances apart in the direction of the length of the burner, the wide
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side wall of the burner adjacent the nozzles
having a plurality of elongated openings in
axial alignment with the nozzles, which ex-
tend into the openings, the outside of the
manifold and the outside of the wall having
the openings being connected whereby the
nozzles will be enclosed in a chamber that is
in communication with the inner end of the
air passage, the nozzles being each provided
with openings through their walls which con-
nect their interiors with the inner end of the
air passageway for the purpose of permitting
air to flow into the nozzles and mix with the
gas therein, the wide side wall of the burner
opposite from the one having the openings
being provided at its lower edge with a flange
adapted to serve as a support for a plate and
near its upper end with a channel adapted
to support plates of refractory material.

In testimony whereof I affix my signature.
GASTON BROWN KILLAM.

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